Determination of Wide-Aperture Electron and X-Ray Beams Transverse Sizes

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Radiation sources is widely used in different science and technological applications. Currently many medical centers are equipped with radiation medical setups, such as X-ray tubes and charged particle accelerators. To provide correct operation of these setups in the treatment and diagnosis procedures it is necessary to control spatial parameters of radiation beams. To determine such parameters X-ray and dosimetry films is widely used in medical practice. These approaches intend using of consumables that increases the operating cost of these devices. Two other disadvantages are the necessity of accurate control of the replaceable sensitive elements parameters and impossibility of on-line monitoring of beam parameters. Therefore, it is prospective to create a uniform non-disposable devise for measurement of X-ray and electron beams transverse sizes.

Nowadays, the method for measurement of electron beam sizes based on wire scanning is well studied and widely used. This method implies thin metal wire motion in a plane perpendicular to the beam propagation while detector is located behind the wire. Thus, the beam is partly absorbed and scattered by the metal that causes changing of the detector signal. Besides, to measure the beam with sizes up to tens of microns laser wire scanners is also used.

In this work the sizes of electron and X-ray beams is measured using one uniform scintillation scanner, which is a thin scintillation strip, in which analyzed beam generates light photons. These photons is guided by the optical fiber to photomultiplier. The intensity of light photons is proportional to the quantity of absorbed energy and consequently to the flux of primary radiation passing through it.

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